Investing in Livestock Development in Water-Scarce Semi-Arid Watersheds: Technological, Institutional and Policy Dimensions

Ranjitha Puskur

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1. Introduction

Watershed Development Programmes (WDPs) in India were conceived as tools for correcting the regional imbalances in agricultural development created by Green Revolution, through investments in soil and water conservation (SWC) and natural resource management (NRM) in rainfed areas. India implements one of the largest watershed development programs in the world. Some 28 million hectares of degraded rainfed land, comprising of nearly 20,000 micro-watersheds have been treated so far with a total investment of about US $ 2000 million (Sharma 2002). The WDPs have evolved from being purely technically oriented SWC programmes to more integrated and participatory programmes aiming at NRM with organisation of beneficiaries (watershed plus) and more recently targeting livelihood improvement (watershed plus plus). Though the overall impact of WDPs has been positive and significant (Rao 2000), with increase in physical and economic access to groundwater (Chandrakanth *et al* 2004), landless and marginal households hardly benefited from watershed development, while the better off households located in downstream areas and with access to irrigation have benefited most (Farrington *et al*. 1999). Recent evidence points out that in many watersheds inequities increased, since for non-land owning and -well owning households access to drinking water, grazing lands and other natural resources decreased (Kerr 2002, Batchelor et al. 2003).

The predominant farming system in almost all watershed areas is the “mixed crop-livestock farming system” under rain fed conditions, supported with limited irrigation. Especially in the ecologically fragile areas of semi-arid watersheds, livestock makes an important contribution to the survival of the economically weaker sections (India Task Force 1987), small ruminants (SR) in particular playing an important role in ensuring rural livelihoods against drought (Pasha 2000).

Livestock holding in general and milch animal holding in particular, appear to be far less iniquitous compared to land holding: marginal and small holders together owned over 67 per cent of all milking animals in 1992. The ***Gini Coefficient*** representing the index of inequity in ownership of dairy stock shows perceptible decline from 0.43 in 1961 to 0.37 in 1971 and further to 0.28 in 1991 (Kurup 2003).

Watershed development programmes are often not recognized as providing substantial benefits to livestock-based livelihood dependence, especially through enhanced productivity of biomass that is or should be accessible to marginal farmers or landless. In watershed villages, location of land determines the crop options, fodder options and consequently livestock options (Ramdas 1995). Intensification has occurred only in cases where the biophysical environment and market access are conducive and in fragile ecosystems the livestock sector productivity has not increased much despite the WDPs and the resulting changes (Ruedi and Luethi-Bourgeois 1994).

Due to the reduction in grazing space and ban on grazing imposed as a part of the WDPs, SR especially goats kept by poor, small farmers were sold in Western Maharashtra (Lobo et al 1995), bovine population increased by 80% while SR declined by 63% (Kulkarni et al 1999). In these cases, the positive impact of the grazing ban on environment and livestock was clear but it is not clear as to how the landless and other poor livestock owners which were dependent on public and private grazing resources were rehabilitated (Kerr 2002).

This paper is based on a research project carried out by the International water Management Institute, South Asia in India during 2002-2005, which attempted to document and understand the livestock-environment-livelihood interactions in watersheds in semi-arid India. This paper elucidates the important role of livestock in livelihoods of communities in water-scarce watersheds and demonstrates that unless livestock interventions are consciously and astutely planned, with due consideration to protecting livelihoods and environment, WDPs might not result in equitable benefits. The paper highlights the major role that technological and institutional factors play in bringing about the livestock development that would impact positively on livelihoods and the accompanying policy changes that are necessary.

2. Study area and Methodology

This study was conducted in five meso-scale watersheds in semi-arid India. Criteria for site selection were relative resource scarcity and economic integration, resource scarcity being estimated by average rainfall and economic integration by location and market access, the rationale being that both bio-physical and socio-economic factors play an

important role in influencing the livestock-environment-livelihood interactions. Some general information about the study watersheds are presented in Table 1.

Hydrological and land use analysis employing GIS/RS techniques has been used to explore the biophysical characteristics in relation to livestock management practices. For the socioeconomic and institutional assessments, primary information regarding livestock and livelihood patterns, resource management and institutions was collected at the village/hamlet level in all the watersheds through focused PRAs and key informant interviews. These qualitative data were ranked by the partner organisations, using the methodological framework provided by Quantified Participatory Analysis (QPA). Household level data was collected from a sample of 200 households in each watershed through questionnaire surveys and statistically analysed.

3. Results and discussion

3.1 Role of livestock in livelihoods and influence of biophysical factors

82% of the households in the study watersheds hold livestock with the livestock densities, especially that of SR, being higher in arid areas. The distribution of large ruminant (LR) holding is more unequal and correlated to landholding size than that of SR.

In the watersheds with higher biophysical potential and market access, livestock production is more intensive with dairy enterprise taking a prime place. But in watershed (Kosgi) where irrigation development is better, there is less reliance on livestock production for income. Where irrigation is not developed (Vaiju), dairy production with

crossbred animals and stall-feeding with strong external dependence for feeds, fodder and supplements is the major livelihood option. However, this watershed in times of drought faces severe feed/fodder shortages and the cattle camps organized by the government help them tide through these times. There is high mortality and animal sales to cope, making the production unsustainable and risky. In watersheds where both robustness and market access are not favourable, small ruminant production is the major livelihood activity. Dependence on bullocks for draught power is high in all watersheds except Kosgi (higher mechanization due to irrigated cash crop farming) as also the importance of manure.

The correlation between the biophysical robustness of the watershed and the intensity of the livestock reared is positive at 76% and stronger with the LR density than with the SR density. The results show that aridity is not a limiting factor towards livestock rearing and that it increases the dependence of the communities on the livestock production.

While non-livestock owners earn 81% of their income from non-farm sources, only 43% of total income of livestock owners comes from off-farm labor and migration. Households dependent solely on SR tend to be worse off: 80% of these households earn an income below the average of the watershed they are in.

The study provides evidence to demonstrate that market access defines the degree of livestock exploitation and its impact on natural resources, and inputs and services. Despite being a not very robust or endowed watershed, Vaiju Babulgaon has the most

intensive system primarily attributable to the established dairy co-operatives and milk route. Though livestock production is not the major livelihood activity or income source, the system is relatively intensive in Kosgi owing to market access. However, even the commercially oriented farmers are highly vulnerable to market fluctuations and are adversely affected during droughts in the absence of adequate support mechanisms.

3.2 Livestock feeding and management

Generally in Indian semi-arid watersheds, free grazing and stall feeding are not mutually exclusive, but co-exist with the relative importance varying depending on the cropping intensity; proximity to forests, wastelands, and fallow lands and; access to markets for milk and fodder (Puskur 2002). In general, large ruminants (LR) are partly stall-fed and partly left to graze, whereas SR are left to graze (Fig 1).

Crop residues form the major portion of feed for LR. In Kosgi, in case of their non-availability, farmers sell their livestock. In Ladki nadi their importance has been increasing due to lack of forests and reduction in grazing lands. In about 30% of the villages, some farmers report an improved availability due to yield improvements, attributed to adoption of improved agricultural techniques and access to irrigation (Fig 2). In Kosgi, due to the increasing cultivation of cash crops, the availability has decreased and higher usage of pesticides has reduced the quality. In Vaiju while in some villages, most farmers report an increase in crop residue availability and quality due to use of HYV seeds and chemical fertilizers in the others, most farmers report a decline due to stunted HYV crop growth because of scarce irrigation water. Some report a decline due

to land degradation and resulting bad land texture and frequent drought. The implications this has had for livestock composition and feeding practices remains however unclear.

Though it is true that aridity or biophysical robustness of a watershed, through its limitations on feed resource availability does not appear to be a major constraint in livestock development, given that there are substantial trans-watershed boundary feed imports and exports, caution has to be exercised while planning livestock development in low potential watersheds. Unless favourable market conditions exist which lead to a market-oriented livestock production, this will remain a major constraint and is especially true of SR, which mainly depend on free grazing. In the event of droughts, the farmers are unable to cope with these shocks and are adversely affected. There are also costs to be paid in terms of environmental degradation, if such caution is not exercised.

The mandate of providing fodder to landless and forest-dependent communities has historically been under the purview of the Forest Department, which provides no clear directives for enhancing fodder supply to meet requirements, nor any mechanism of managing livestock-environment-forest conflicts despite policy intentions. Various forestry programmes develop plantations of non-fodder and non-browsable species to enhance biomass and vegetative cover, to overcome unsuccessful efforts at building social norms for protection. The traditional rights granted to villages under the joint forest management policy are not complemented with maintenance and management responsibility. There is a long gestation period before the communities can reap any benefits from these protected areas. In many instances, there are conflicts over rights to

usage of products. The recent draft on environmental policy does talk of process related and legislative reforms but implementing them will be a challenge.

There are no concerted efforts in watershed development areas to improve fodder availability in the watershed. One of the issues that hampers livestock and watershed development is that coordination among various government departments and, between government and NGOs is not strong enough to adopt a holistic development policy for an area. Local self government bodies such as gram panchayats increasingly have powers related to this issue. Achieving effective coordination among the many development players in the watershed area is not easy. Only through such coordination will it be possible to include the crucial dimensions of livelihood dependence of poor on the livestock sector and the value of livestock assets in poverty reduction (especially SR) in the Government watershed development strategy.

3.3 Livestock services

Even though some watershed projects tried to promote livestock development, this was not accompanied by making provisions for attendant service delivery, be it credit or health and breeding services.

3.3.1 Access to institutional credit

Table 2 demonstrates the limited use of credit services for livestock production in the study watersheds, mainly on account of non-availability, except in Vaiju where commercial dairy production is prevalent. The poorer households, especially small

ruminant holders, have little or no capital resources to invest in their livestock enterprise. Investments to acquire or upgrade to better breeds or for improved health care, feeding and management practices – all of which have the combined effect of reducing environmental stress – are too luxurious for them. They resort to keeping larger stocks to break even, thus increasing the pressure on environment.

Limited access to formal/institutional sources of credit affects livestock production possibilities of poor farmers and pastoral communities. Bullocks are not financed by most local banks. Those that do, insist that they should not be sold during the summer as they are categorised as long-term assets. In such cases, poorer sections of farming community and women resort to borrowing from private lenders at usurious rates and end in debt traps. Keeping cattle during acute scarcity periods makes poor families and their investments vulnerable. During such periods they sell their livestock at low rates and acquire them again after the onset of rainy season. This replacement is usually at a much higher cost and is a set back to their asset-building capabilities. This inevitable pattern of seasonal sales and purchases is not taken into account by the formal credit institutions.

Credit facilities from local banks and cooperatives for the acquisition of dairy animals played a major role in most WDPs in western Maharashtra, where the improved productivity resulted in tangible benefits to the milk market. Many of the bankers in Maharashtra, which finance the purchase of livestock, particularly goats, insist on training/working knowledge of livestock production management as a pre-condition while financing the enterprise.

NABARD has been promoting credit, routed through nationalised banks, for livestock purchase, setting up commercial units of small and large animals, livestock products processing plants. This has benefited a large number of private entrepreneurs, farmer cooperatives and organisations.

- WDPs and lending institutions should facilitate linkages between livestock rearing groups, especially women's SHGs and institutional credit sources.
- Access to market and feed/fodder resources, as well as borrowers' working knowledge of related livestock production and processing activity should be considered as prerequisite for lending.
- Short term credit facility being provided to agriculture sector should be extended to animal husbandry sector as well and be linked with access to breeding, health, extension and marketing services.
- Livestock should be insured for covering the risk of loss of production.

3.3.2 Livestock health and breeding services

Fig 3 illustrates the lack of awareness and availability of livestock health services in the study watersheds. The watershed guidelines of 1990 contained provisions that supported livestock rearing eg., seed money for medicines and petty instruments; vaccination, primary health care and first aid; deworming, castration of scrub bulls etc. Livestock services that are currently provided by state governments are largely

inaccessible to the poor and their quality is also dubious and these households cannot afford private services.

The National Livestock Policy has so far only focused on LR breeding. There is a need to bring explicit focus on SR breeding considering their importance for livelihoods in rainfed areas. The DANIDA watershed development programme tried SR upgrading in Madhya Pradesh and Karnataka. BAIF, an NGO, introduced door-step delivery of Artificial Insemination Services for dairy animals as early as 1970. These services were initially funded by farmer cooperatives and later on by the government. At many places, local youth are being encouraged to run the activity as a self-employment, which has resulted in increased demand for these services. Following this experience, many government agencies/ programmes have been encouraging breeding services and veterinary first-aid delivery through the 'Gopal Mitra scheme'. Such schemes should be given a boost.

- Livestock para-workers have proven to be efficient in terms of service delivery in WDPs. They must be officially recognised and their training curriculum reviewed periodically to suit the emerging needs specific to various regions/livestock production systems, in collaboration with Animal Husbandry departments. Isolating their services from those of the department for supply of vaccines and other medicines, would not be efficient.
- Capacity building of para-vets and other community based livestock service providers to handle day to day livestock service needs should be stressed.

3.3.3 Access to skills, knowledge and information

Skills, knowledge and information are the most critical factors that help in empowering landless, small and marginal farmers. The National Livestock policy does not touch on the issue of training and awareness building of livestock rearing households. The existing "training and awareness" infrastructure is inadequate to cater to both current and future needs, is located in comparatively well-developed areas and is inaccessible to livestock owners in remote farms and hamlets. The availability of skilled human resources is inadequate. Together these factors result in the poor exploitation of technology and a loss of traditional knowledge and practices, which in turn adversely affect not only the profitability of livestock rearing but also the environment.

- Under previous watershed guidelines, at least 10% of project cost was earmarked for activities related to animal husbandry, including farmer training. In arid areas, about 30% of the project fund was provided for livestock development. This scheme should be revived.
- The training curriculum should be expanded to include livestock rearing families under the productivity enhancement activities, under the works budget, rather than under the training budget which is inadequate to provide such inputs.
- The district administration should take the lead in linking up WDPs with the animal husbandry training infrastructure to reorient and expand to remote but potentially productive areas.
- WDPs could help in establishing village level information centres that may be managed by farmers or SHGs and CBOs, with backstopping from the extension service.

3.3.4 Social organization

The study proves that without organizing livestock producers in the watershed, livelihood- livestock-environment interactions are not sustainable. Even though the livestock producers are not organised directly into groups, they are part of the watershed community and in principle are parties to the watershed and NRM decision making. However, evidence is available to show that the decision making and influencing in the watersheds is not very equitable. The poor, who are landless and small holders and who mainly own the SR, and also belong to the economically and socially disadvantaged communities, lose out on this account. Most decisions do not take into account the role of SR in watershed livelihoods and their needs. Excluded livestock owners must then “battle" the increasingly harsh environment rather than protect and adapt to diminishing local resources on their own. More often than not, this means that they must sell their asset. In addition, it has a long term debilitating effect on the environment because groups excluded from decision-making bodies are unable to understand and influence the link between sustainable livelihoods and the preservation of ecological environments.

- There is a need to take the livestock producer groups at district level to the watershed/panchayat level for them to have a strong voice in the local decision making process. Being organised will allow them to take advantage of institutional support, and to take an active part in the decision making process to ensure they stick to agreed norms and regulations.

- Watershed guidelines should explicitly mention the inclusion of all livestock owners including migrant, landless and small farming families, especially women, who primarily constitute SR rearers so that these groups are consciously involved in decision-making processes.
- Watershed guidelines should stipulate that livestock rearing families should be included as stakeholders in common resource user groups, considering their dependence on them while planning their management and use.

4. Conclusions

Livestock, especially SR, play a major role in livelihoods of communities, especially the poor and women in water-scarce watersheds. However, this is not adequately recognized while planning watershed development activities, especially the provision of adequate feed resources and support services. This leads to them being marginalized and their coping strategies negatively affecting the environment. Appropriate technological, institutional and policy options need to be operationalised to mitigate these negative effects and enhance the positive effects.

References

Batchelor, C., Rama Mohan Rao and Manohar Rao (2003), Watershed development: A solution to water shortages in semi-arid India or part of the problem?, *LUWRR,* 3, pp: 1-10.

Chandrakanth, MG, Bisrat Alemu and Mahadev G Bhat (2004), Combating negative externalities of drought – Groundwater recharge through Watershed development Programme, *Economic and Political Weekly,* March 13, pp:1164-1170

Farrington, J (ed) (1999), *Participatory watershed management*, Oxford University Press.

India Task Force, 1987. Report of the Task Force to evaluate the impact of sheep and goat rearing in ecologically frazile zone, 1987, GOUI, Ministry of Agriculture, Department of Agri & Cooperation, New Delhi.

Kerr, J (2002), Watershed development, environmental services and poverty alleviation in India, *World Development*, Vol. 30(8): 1387-1400.

Kulkarni B N, S D Kulkarni and K U Viswanathan, 1999. Evaluation study of Mendhavan Watershed Project under IGWDP – Maharashtra state, National Bank for Agriculture and Rural Development, Mumbai.

Kurup, MPG (2003), *Livestock Policy Synthesis*, Unpublished report prepared for the LEAD India Study, IWMI, Hyderabad.

Lobo Crispino and Gudrum Kochendorfer-Locous, 1995. The rain decided to help us. The World Bank, Washington, DC, EDI Learning Series: Pimpalgaon Wagha Project.

Pasha S M 2000. Economic and ecological dimensions of Livestock Economy, Commonwealth Publishers, New Delhi.

Puskur, Ranjitha. 2002. Conversion from free range grazing to managed feeding: technological and institutional issues, in Birthal, P. and P. Parthasarathy Rao (eds), Technology Options for Sustainable livestock production in India, Proceedings of the workshop on Documentation, Adoption and Impact of Livestock technologies in India 18-19 Jan 2001, ICRISAT, Patancheru, India.

Ramdas Sagari R, 1995. An appraisal of Livestock Production systems in Watershed Development Programmes of IC NGO Partners, Chittor District, Andhra Pradesh.

Rao, Hanumantha C H, 2000. Watershed development in India. Recent experience and emerging issues, Wastelands News, August-October 2000: 9-14.

Ruedi and Nancy Luethi-Bourgeois, 1994. Study on trends in the cropping patterns and animal husbandry practices due to watershed treatment in the PIDOW project area. Karnataka state, India (Student Dissertation), Swiss College of Agriculture, 3052 Zollikofen, Switzerland.

Sharma, R. 2002. Watershed Development: Adaptation Strategy for Climatic Change. Paper presented to South Asia Expert Workshop: Adaptation to Climate change for Agricultural Productivity organized by UNEP, CGIAR and Govt of India.

Table 1: Description of study watersheds

Name of watershed	**V.Babulgaon**	**Kanakanala**	**Kalyanpur**	**Kosgi**	**Ladki Nadi**
State	Maharashtra	Karnataka	Rajasthan	A.P	M.P.
Average annual rainfall (mm)	430	499	584	739	1024
Market access	High	Limited	Limited	High	Limited
Watershed area (ha)	4876	13064	7488	3460	5838
Livestock intensity (ACU/ha)	0.99	1.36	1.54	0.71	1.56
Treated area (%)	24	43	44	56	90
% Irrigated area	7	10.4	29.5	40.3	58.9
LR/hh	3.21	3.04	4.39	2.45	3.59
SR/hh	4.24	6.48	6.29	1.04	2.53

Table 2: Proportion and source of credit for livestock production in study watersheds

	V.Babulgaon	**Kanakanala**	**Kalyanpur**	**Kosgi**	**Ladki Nadi**
Proportion of HH loans for livestock in total (%)	26.4	6.1	0.8	8.1	1.1
Source	**No. of Households (out of a total of 200 in each site)**				
Bank	8	2		3	1
Money lender	3	1	1	7	
Family friends	1			1	
SHG	3	4		1	
Co-ops	14				1
Total	29	7	1	12	2

Fig 1 Feeding practices of small and large ruminants

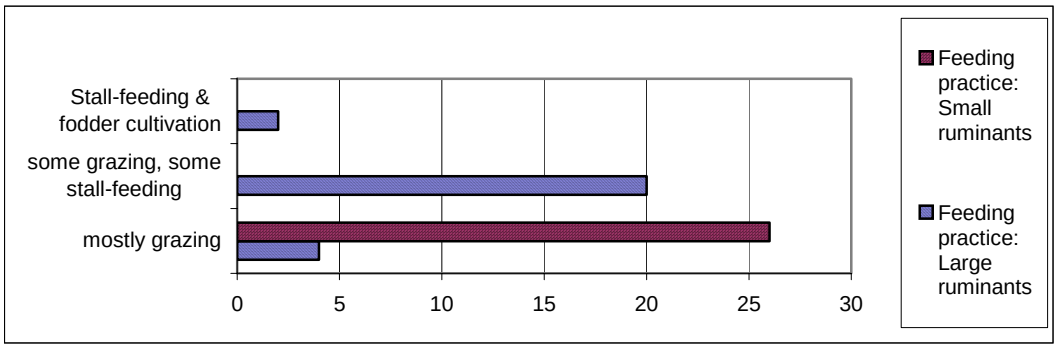


Fig 2 Crop residue availability

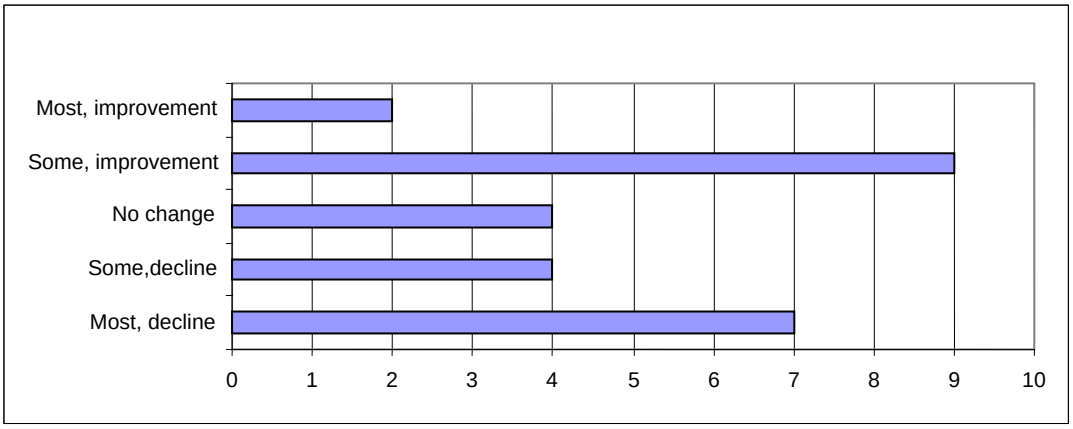
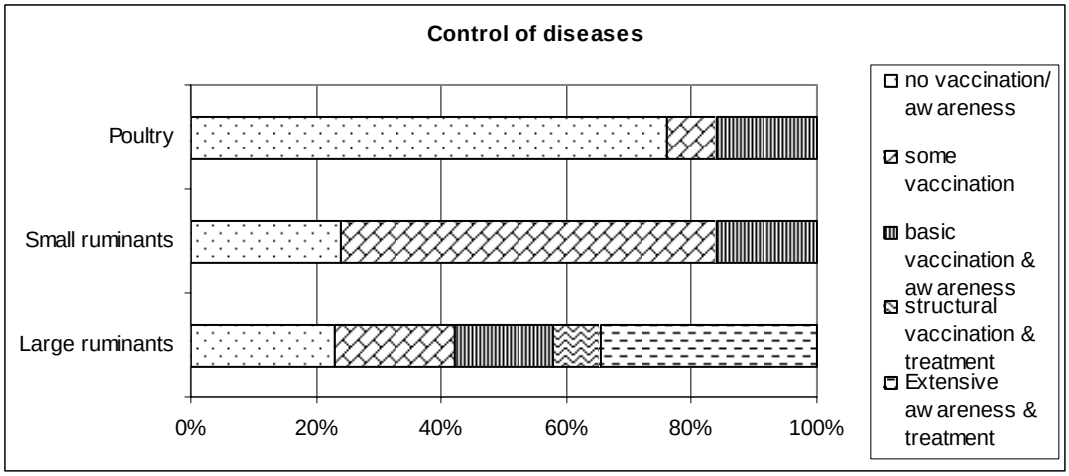


Fig 3 Livestock Health care in study villages



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